

**REMARKS**

Claims 1-16 are pending in this application. By this Amendment, claims 1, 2, 9 and 12 are amended, and new claims 15 and 16 are added. Support for the amendments to claims 1, 2, 9 and 12 and for new claims 15 and 16 can be found in the specification as originally filed, for example, at page 3, lines 10-13; page 3, lines 24-27; page 4, lines 1-2; page 4, lines 20-21; and in original claims 1, 2, 9 and 12. No new matter is added.

**I. Claim Rejections Under 35 U.S.C. §112**

The Office Action rejects claims 1-11 under 35 U.S.C. §112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. While Applicants do not necessarily agree with the rejection, claims 1 and 2 have been amended herein to more clearly set forth the subject matter therein. Specifically, claim 1 is amended to replace the phrase "less than 10 mole% of the lactate ion are other negatively charged ions" with the phrase --said broth including negatively charged ions that are not lactate ions in an amount of less than 10 mole% based on a total amount of lactate ion in the broth--, and claim 2 has been amended to remove the phrase "and preferably at least 0.3 equivalents of the multivalent ion," which is the subject matter of new claim 15. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

**II. Claim Rejections Under §102**

The Office Action rejects claims 12-14 under 35 U.S.C. §102(b) over U.S. Patent No. 6,331,236 to Mani (Mani 236) and also rejects claims 12-14 under 35 U.S.C. §102(b) over U.S. Patent No. 6,221,225 to Mani (Mani 225). Because the disclosures of these references and the rejections over the references are closely related, Applicants respectfully traverse the rejections together.

The Mani references disclose apparatuses for producing salts by electrodialysis that include cells that have compartments defined by ion exchange membranes. *See* Mani 236, col. 1, lines 16-31; Mani 225, Abstract. Specifically, Mani 236 and Mani 225 disclose cells in which a cathode is adjacent to a cationic side of a bipolar membrane, the anionic side of the bipolar membrane and an adjacent anionic membrane form a salt/base compartment, the anionic membrane and a cationic side of a second adjacent bipolar membrane form an acid compartment, the anionic side of the second bipolar membrane and a second anionic membrane form a second salt/base compartment, and the second anionic membrane is adjacent to an anode. *See* Mani 236, Fig. 1(a), col. 4, lines 24-48; Mani 225, FIG. 1(A), col. 4, lines 26-49. The first bipolar and anionic membranes of the Mani references define a unit cell that may be repeated to form multi-cell units between a cathode and an anode. *Id.* That is, the cited references teach that for a simple cell, membranes are arranged cathode–bipolar membrane–anionic membrane–bipolar membrane–anionic membrane–anode. *See generally* Mani 236, Mani 225. Based on these disclosures, the Office Action takes the position that each of the Mani references anticipates independent claim 12 and its dependent claims 13-14. Applicants respectfully disagree.

Independent claim 12 sets forth, in pertinent part, an "electrodialysis or electrolysis apparatus ... comprising a first compartment which is limited by an anion-selective or non-selective membrane and a cathode, ... and a second compartment limited by the anion-selective or non-selective membrane and an anode." Claims 13 and 14 depend from claim 12 and incorporate all of the limitations thereof.

The apparatus of claim 12 defines a simple cell as having membranes arranged in either of two manners: (1) cathode–anion-selective membrane–anode or (2) cathode–non-selective membrane–anode. That is, the first compartment is defined by a cathode and either

an anion-selective membrane or a non-selective membrane, while the second compartment is defined by an anode and either an anion-selective membrane or a non-selective membrane.

In contrast, each of the Mani references teaches that the cathode is adjacent to a cationic side of a bipolar membrane, not an anion-selective or non-selective membrane, as set forth in claim 12. *See generally* Mani 236; Mani 225. Because Mani 236 and Mani 225 each fail to disclose an apparatus that includes at least "a first compartment which is limited by an anion-selective or non-selective membrane and a cathode," as set forth in independent claim 12, neither Mani 236 nor Mani 225 teaches all of the features of independent claim 12.

For at least the above reasons, independent claim 12 and its dependent claims 13 and 14 are patentable over each of Mani 236 and Mani 225. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

### **III. Claim Rejections Under §103**

The Office Action rejects claims 1-11 under 35 U.S.C. §103(a) over Mani 236 and also rejects claims 1-11 under 35 U.S.C. §103(a) over Mani 225. Because the disclosures of these references and the rejections over the references are closely related, Applicants respectfully traverse the rejections together.

Independent claim 1 sets forth, in pertinent part, a "method of separating multivalent ions and lactate ions from a fermentation broth ... , the method comprising: introducing the broth into a first compartment, said broth having a multivalent ion concentration of at least 0.1 mole/l, said broth having a lactate ion concentration of less than 300 g/l, said broth including negatively charged ion that is not lactate ion in an amount of less than 10 mole% based on a total amount of lactate ion in said broth, and said first compartment being limited by an anion-selective or non-selective membrane and a cathode." Claims 2-11 depend, directly or indirectly, from claim 1 and incorporate all of the limitations thereof.

The Office Action applies the same teachings of Mani 236 and Mani 225 to independent claim 1 and its dependent claims 2-11 as to claims 12-14, discussed above. The Office Action admits that neither Mani 236 nor Mani 225 teach or suggest a method of separating multivalent lactate ions from a fermentation broth that contains at least 0.1 mole/l of multivalent ions and less than 300 g/l of lactate ions. Based on the methods associated with the Mani 236 and Mani 225 apparatuses, the Office Action takes the position that claims 1-11 would have been obvious over each Mani reference. Applicants respectfully disagree.

As discussed above, neither Mani 236 nor Mani 225 teaches, and neither Mani reference suggests, a method in which a fermentation broth is added to a first compartment that is "limited by an anion-selective or non-selective membrane and a cathode," as set forth in independent claim 1. Instead, Mani 236 and Mani 225 each only teach methods in which a salt solution is added to a salt/base compartment that is defined by the anionic side of the bipolar membrane and an adjacent anionic membrane. *See* Mani 236, Fig. 1(a), col. 4, lines 24-48; Mani 225, FIG. 1(A), col. 4, lines 26-49. That is, the Mani 236 and Mani 225 references do not teach methods in which the salt solution is added to a compartment formed by a cathode and an anion-selective or non-selective membrane, as set forth in claim 1. *See generally* Mani 236; Mani 225.

Because neither Mani reference teaches or suggests a method for separating multivalent ions and lactate ions from a fermentation broth in which the broth is introduced to a first compartment that is limited by an anion-selective or non-selective membrane and a cathode, as required by independent claim 1, claim 1 and its dependent claims would not have been obvious over Mani 236 nor Mani 225.

For at least the above reasons, claims 1-11 are patentable over each of Mani 236 and Mani 225. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

**IV. New Claims**

By this Amendment, new claims 15 and 16 are added. Claims 15 and 16 depend from independent claims 1 and 12, respectively, and include all of the limitations of the independent claims from which they depend. Applicants respectfully submit that, for at least the same reasons set forth above with respect to claims 1 and 12, claims 15 and 16 are patentable over the cited references.

**V. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-16 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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